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BOOK REVIEWS.

Send all communications to W. H. Bussey, University of Minnesota.

William Oughtred, a Great Seventeenth-Century Teacher of Mathematics. By Florian Cajori. The Open Court Publishing Company, Chicago, 1916. vi + 100 pages. $1.00.

The story of William Oughtred is told by Professor Cajori in a delightful and entertaining manner. Oughtred's life covers the last quarter of the sixteenth century and the first half and part of the third quarter of the seventeenth century. This period in the history of mathematics is of particular significance because the wider dissemination and diffusion of mathematical knowledge during this time undoubtedly paved the way for the revolutionary developments of mathematics which took place in the seventeenth century. Mathematics is indeed a study which requires that its devotee withdraw himself from the world of affairs for reflection and meditation; however the great advances in this subject have been made at those times when large numbers of individuals were devoting themselves to the science. Such a time was this in which Oughtred lived. In England and in France there were many not connected with institutions of learning, men like Oughtred, like Napier, Vieta, Fermat and Descartes, who devoted themselves to the study of mathematics entirely because of an intellectual interest in the subject. Oughtred's devotion to the science was unbounded; not only did he instruct many in the "difficult poynts of the Art" gratis, but to certain specially gifted students he gave at the same time both bed and board.

The three principal works published by Oughtred are the *Clavis Mathematicae* of 1631, the *Trigonometria* of 1657, and *The Circles of Proportion* of 1632. All three works are of real importance in the development of elementary mathematics. The first work, which like the others is extremely concise, treats particularly of the numerical solution of equations; the *Trigonometria* and the *Clavis, The Key of the Mathematicks* as it was called in the English translation of 1647, are in advance of many contemporary mathematical works in the generous use of algebraic symbolism; *The Circles of Proportion* discusses the slide rule, of which, as has been proved by Professor Cajori, Oughtred was the inventor. Among his minor works several relate to the theory of mathematical instruments designed by Oughtred. These works enjoyed a wide popularity.

The two closing chapters of this little book are in many respects the most important, since they give a somewhat critical estimate of the Reverend Oughtred's influence upon mathematical progress and teaching and his ideas on the teaching of mathematics. Any teacher of mathematics and any "amateur" in mathematics of the type of Oughtred, if there be such in this practical day, will find great pleasure and intellectual profit in the reading of this work of Cajori's. I call attention to two mistakes. On page 83 the name of Erasmus O. Schreckenfuss is misspelled. On page 21 the statement is made that "the decimal point (or comma) was first used by the inventor of logarithms, John Napier, as early as 1616 and 1617." But all the standard authorities on this subject agree that the point or comma was first used by the German Pitiscus in the 1612 edition of his trigonometry.[1] Napier has apparently no claim whatever to priority in the field, nor even to independent discovery for it is well established that he was familiar with the works of Pitiscus. The error is particularly unfortunate at the present time.

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PROBLEMS FOR SOLUTION.

SEND ALL COMMUNICATIONS ABOUT PROBLEMS TO B. F. FINKEL, Springfield, Mo.

ALGEBRA.

473. Proposed by J. J. GINSBURG, Student, Cooper Union, New York.

Factor the expression $x^{30} + x^{25} + x^{20} + x^{15} + x^{10} + x^5 + 1$.

474. Proposed by A. A. BENNETT, University of Texas.

Show that the value of the infinite continued fraction, all of whose coefficients are unity, $1 + \frac{1}{1+}\frac{1}{1+}\cdots$, is $\frac{1}{2}(1 + \sqrt{5})$. Also find an explicit algebraic formula for the nth convergent.

GEOMETRY.

505. Proposed by O. S. ADAMS, Coast and Geodetic Survey, Washington, D. C.

Construct a triangle, having given the sum of two sides, the angle included by these sides, and the altitude from the given angle upon the third side.

506. Proposed by S. A. COREY, Albia, Iowa.

Given a pentagon, plane or gauche, whose sides a, b, c, d, e are represented by the vectors x, y, z, v and $(x + y + z + v)$, respectively; and a second pentagon whose sides a_1, b_1, c_1, d_1, e_1 are represented by the vectors r, s, t, u and $(r + s + t + u)$, respectively, where

$$r = c_1x - c_5c_2y - c_6c_3z + c_5c_6c_4v, \quad s = c_2x + c_1y - c_6c_4z - c_6c_3v, \quad t = c_1z + c_3x + c_5c_2v + c_5c_4y,$$

$$u = c_1v - c_4x - c_2z + c_3y, \qquad c_1, c_2, c_3, c_4, c_5 \text{ and } c_6 \text{ being ordinary scalars.}$$

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[1] As the introduction of the decimal point in 1616 and 1617 by Napier is claimed also in the recent Napier Tercentenary Volume it seemed to me worth while to verify the assertions which have been made in standard works on the subject, concerning the introduction of the decimal point by Pitiscus in 1612. I am enabled to do so through the courtesy of Professor David Eugene Smith and one of his students. In the *Canon Triangulorum emendatissimus et ad usum accommodatissimus, pertinens ad Trigonometriam Bartholomaei Pitisci, Grunbergensis Silesii* (Francofurti, Typis Nicolai Hoffmani, sumptibus Ionæ Rosæ, Anno M.DC.XII) Pitiscus uses for the sine of ten seconds the value 4.85 with the radius 100000; the value to 8 places is .00004848. Even more explicitly in the *Trigonometry* itself, also of 1612, Pitiscus uses a vertical bar and says: "Deinde pro latere AC nuper invento 13 | 00024 assumo 13 fractione scilicet 24/100000 neglecto quare ferme nullius fit momenti." It is thus evident that the 4.85 above which represents the decimal value was used with full consciousness of its significance by Pitiscus. I note also the use of the bar in the work of 1612, Bartholomaei Pitisi *Problematum Variorum* (Frankfurt). A further point worth noting is that Napier cites the earlier editions of Pitiscus, making it almost certain that between 1612 and 1616 he had copies of these works of 1612 in his hands. These works are in the New York Public Library.